

PATENT CLAIMS (as originally filed and published)

- 5 1. A method for operating a magnetic logic device (10) in which at least one output variable  $O = F(I_A, I_B)$  is formed from input variables  $(I_A, I_B)$  by at least one logic operation with an operator function  $F$  of the magnetic logic device (10),
- 10 characterized in that the logic device (10) is set with a certain operator control signal (SET) at a starting state for execution for the operator function  $F$  before the operation, whereby the operator control signal is selected from a
- 15 group of control signals with which various non-volatile starting states can be set in a controlled manner, each of these states being characteristic of a different logic function.
- 20 2. The method according to Claim 1, in which starting states can be set with the control signals, each state being characteristic of a logic function from the group of logic AND, OR, NAND and NOR functions.
- 25 3. The method according to Claim 1, wherein starting states can be set with the control signals, each state being characteristic of a logic function from the group of logic AND and OR functions or logic NAND and NOR functions.
- 30 4. The method according to any one of the preceding claims, wherein the control signals are control current signals under the influence of which magnetic fields are generated or they include switching signals under the influence of which remagnetization occurs, wherein the
- 35 respective logic function is set in the logic device (10) by the magnetic fields or the remagnetization.

5. The method according to Claim 4, wherein the control current signals are sent via input lines (14, 15, A, B, C) to the input of the input variables ( $I_A$ ,  $I_B$ ) into the logic device (10).
- 5 6. The method according to Claim 4 or 5, wherein the control current signals have constant current values.
- 10 7. The method according any one of Claims 4 through 6, wherein the control current signals include switched-mode currents.
- 15 8. The method according to any one of the preceding claims, wherein the logic device (10) receives input current signals for input of the logic input variables ( $I_A$ ,  $I_B$ ).
- 20 9. The method according to Claim 8, wherein the input current signals and the control current signals have the same values.
- 25 10. The method according to any one of the preceding claims, wherein the magnetic logic device (10) has at least one magnetic element (11) with at least two magnetic setting elements (12, 13), which are set with the operator control signal (SET) for executing the operator function F.
- 30 11. The method according to Claim 10, wherein the magnetic element (11) has two magnetic setting elements (12, 13), whereby the coercitive field strengths and the current values of the input current signals are coordinated so that both setting elements can be set by the operator control signal.
- 35 12. The method according to Claim 10, wherein the magnetic element (11) has two magnetic setting elements (12, 13), whereby the coercitive field strength of one of the

setting elements (13) is selected to be so high that it cannot be changed with the input current-signals.

- 5 13. The method for operating a magnetic logic circuit (30), comprising a plurality of logic devices (10) with which a plurality of logic operations may be executed either simultaneously or in succession according to a method as characterized in any one of the preceding claims.
- 10 14. The method according to Claim 13, wherein each logic device (10) executes the same or different logic operations in succession.
- 15 15. A logic device (10) with at least one magnetic element (11), at least two inputs (14, 15) and at least one output (16), whereby the logic device (10) is provided for executing at least one logic operation in which at least one output variable  $O = F(I_A, I_B)$  is formed from input variables  $(I_A, I_B)$  with an operator function  $F$ ,  
20 characterized in that the magnetic element (11) is connected to a control circuit (20) which is equipped for providing an operator control signal which is selected from a group of control signals with which various non-volatile starting states  
25 of the logic device (10) that are characteristic of different logic functions can be set and for setting the logic device (10) at a starting state according to the operator control signal.
- 30 16. The logic device (10) according to Claim 15, wherein the control circuit (20) has a current source (21) and a switching device (22) with which the magnetoresistive element (11) can receive the operator control signal.
- 35 17. The logic device (10) according to Claim 15 or 16, wherein the control circuit (20) has an operator function selector (23) with which the operator control signal is selectable.

18. The logic device (10) according to any one of Claims 15 through 17, wherein the magnetic element includes a magnetoresistive element (11).
- 5 19. A logic circuit (30) having a plurality of logic devices (10) according to any one of the preceding Claims 15 through 18.
- 10 20. The logic circuit according to Claim 19, wherein each logic device (10) is connected to a separate control circuit (20).
- 15 21. The logic circuit according to Claim 19, wherein the logic devices (10) are connected in groups or collectively to a common control circuit (20).